

## Schwarz-1, Henry

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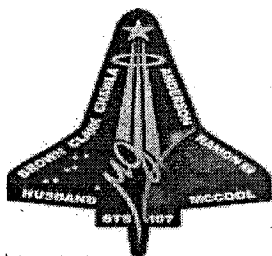
**From:** Palmer, Michael J [michael.j.palmer@usago.ksc.nasa.gov]  
**Sent:** Wednesday, December 18, 2002 8:36 AM  
**To:** Douglas, Tamara A  
**Subject:** STS 107 L-1 System S0017.ppt

MPS input for the L-1 pitch.



STS 107 L-1 System  
S0017.ppt

ITEM  
6



## USAGO Shuttle Engineering

Kennedy Space Center, Florida

### STS-107 / OV-102 L-1 Day Crew Briefing (S0017)

System / Presenter

**SYS: Michael Palmer**

**NASA: Tamara Alexander**

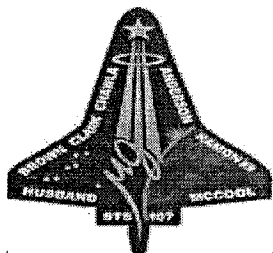
#### DISPOSITION OF STS-102 IN-FLIGHT ANOMALIES:

- Problem: E-1 LH2 Prevalve Open A Indicator failed shortly after MECO (MER-6)

Cause: Currently an Unexplained Anomaly, most probable cause an intermittent open circuit.

Resolution: Troubleshooting consisted of resistance checks of valve's micro switch, tap checks on valve's actuator, wire wiggle checks, wire and connector inspections, voltage and continuity checks and impedance matching test. Indicator was also monitored during all power up periods for additional drop outs. All troubleshooting results were nominal and no other drop outs have occurred. Anomaly has been deferred for one flight as UA PR UA-2-A0046. If no other drop outs occur during on orbit operations the PR will close next flow. Similar anomalies have occurred on OV102 E-3 LH2 Open B Indicator (two occurrences) and OV104 E1 LH2 Open B Indicator (three occurrences).

Impact: Measurement is redundant to the Open B Indicator. RSLs commands the LH2 prevalves open at T-9.6 seconds and Open A and B Indicators are verified on at T-7 seconds for Engine Ready (one of two is required). Should a failure of the Open A Indicator fail at the time, accompanied by a simultaneous failure of the Open B indicator, a cutoff would occur. These measurements are not used after this point. To date, all failures of this nature have occurred during ascent, post MECO or while personnel were working in the aft fuselage in the area of the subject valve. The likelihood of a failure at T-7 seconds of both indicators, resulting in a cutoff, is extremely unlikely.



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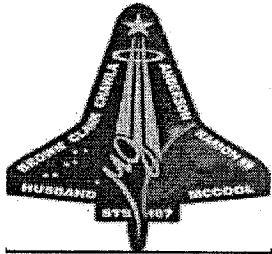
#### DISPOSITION OF STS-102 IN-FLIGHT ANOMALIES:

- Problem: LH2 4" Recirculation Disconnect Failed to Close When Commanded Post MECO (MER-7)

Cause: Mechanical failure of the valve.

Resolution: The LH2 4" Recirculation Disconnect is a pneumatically opened valve. Closure of the valve is spring operated, once the actuator of the valve is retracted into the close position. The actuator of the valve was inspected and a bushing was found to be damaged, causing the valve's spring mechanism to hang up. The valve was removed, replaced and retested.

Impact: None, as the valve has been replaced. Should the new valve experience the same failure, the impact would be a backup mechanical closure of the valve (as occurred during STS-109 ascent) during ET separation.



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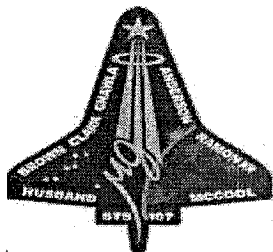
**SYS: Michael Palmer**  
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#### **FLEX HOSE ISSUES:**

- The Main Propulsion System has two cryogenic flex hoses; one LH2 flex hose located in the left-hand Orbiter/ET Umbilical area and one LO2 flex hose located in the right-hand Orbiter/ET Umbilical area. These flex hoses are inspected and mass spec leak checked in the VAB post Orbiter/ET mate. A second leak check is performed during helium signature test. The flex hoses are inspected again by engineering prior to aft closeout for flight.

#### **FEEDLINE FLOWLINER CRACK ISSUES (MPS-2-A0096, MPS-2-A0097, MPS-2-A0098):**

- A crack was found in a LH2 engine feedline flowliner on OV104 during SSME installation. Subsequent inspections on all orbiters revealed three cracks on OV102 engine 2 LH2 downstream flowliner (OV102 flowliners are CRES whereas all other orbiters have Inconel flowliners). The cracks were weld repaired and the flowliner slots were polished to reduce stress risers that could lead to further cracks. The flowliners will be NDE inspected each flow to insure no further cracks have developed.
- During flowliner inspections, three shallow cracks were found on the gimbal to flange weld for two of the LH2 engine feedlines (two on engine 1 and one on engine 2). The cracks were polished out and the polished areas will be reinspected next flow.



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#### MISCELLANEOUS

##### Problem:

- A crack has been found in the ball of the LO<sub>2</sub> 17 inch feedline manifold end ball-strut-tie-rod assembly (BSTRA) on OV103 during routine OMDP inspections.

##### Impact:

- This same inspection was performed on OV102 prior to last flight while the vehicle was at Palmdale for OMDP. No anomalies were noted. As a result of the cracked ball, all BSTRA joints on OV103 and OV104 have been inspected (18 total per vehicle, 3 each on the LO<sub>2</sub> and LH<sub>2</sub> 17 inch feedlines and 2 each on the LO<sub>2</sub> and LH<sub>2</sub> 12 inch SSME feedlines). The LO<sub>2</sub> and LH<sub>2</sub> 17 inch feedlines for OV105 have been inspected and the LO<sub>2</sub> and LH<sub>2</sub> 12 inch SSME feedlines will be inspected once engines are removed. So far, no other cracks in the fleet have been observed. Design is working on a flight rationale based on these inspections. Design is also performing test to better understand the properties of the materials involved.